DOCUMENT RESUME

ED 234 392 CS 207 755

AUTHOR Garrison, Bruce
TITLE Computerization of the Newspaper in the 1980s.
PUB DATE Aug 83
NOTE 38p.; Paper presented at the Annual Meeting of the Association for Education in Journalism and Mass Communication (66th, Corvallis, OR, August 6-9, 1983).
PUB TYPE Information Analyses (070) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Communications; Computer Graphics; Computer Programs; *Computers; Data Bases; Information Processing; Layout (Publications); *Newspapers; *News Reporting; *News Writing; Photographic Equipment; *Technological Advancement
IDENTIFIERS *Electronic Publishing

ABSTRACT

A review of the literature on the computerization of newspaper newsrooms shows that since 1960, computers have assumed an increasingly important role in information collection, news writing and editing, pagination, and news transmission. When newspaper libraries are computerized, reporters are able to find information more quickly and to use reference material more effectively. Using computers in copy-editing tasks permits newsroom staffs to devote more time to careful research. Word processors reduce writing, rewriting, editing, and headline writing time. An increasing number of larger newspapers are computerizing pagination--the laying out of news space, headlines, and advertising--and using computers for facsimile transmissions--electrical transmissions of pages to different printing sites. In the future, computers may be more frequently used in electronic reproduction of newspapers for the home through videotex and teletext and in satellite technology for the transmission of wire service news. Continued advances in computer technology will produce (1) cost-effective geographic and demographic newspapers; (2) better quality newspapers created by faster and more economical production methods; and (3) new data base management and marketing possibilities for auxiliary products and services. (MM)

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COMPUTERIZATION OF THE NEWSPAPER IN THE 1980S

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

By Bruce Garrison
Department of Communication
University of Miami
P.O. Box 248127
Coral Gables, Florida 33124

A paper presented to the Mass Communication and Society Division, Association for Education in Journalism and Mass Communication, annual convention, Corvallis, Oregon, August 6-9, 1983.

CS 207755

Bruce Garrison is associate professor and coordinator of the journalism sequence in the Department of Communication at the University of Miami, Coral Gables, Florida.

He would like to thank the Department of Communication for its support of his research for this paper. He would also to thank graduate research assistant Orlando Mellado for his assistance in compiling the bibliography on the computer in the newsroom. Finally, he is grateful for the support of Alejandro Aguirre, assistant to the publisher, Diario Las Americas, Miami, for readily loaning his ANPA literature.

COMPUTERIZATION OF THE NEWSPAPER IN THE 1980S

We are in a truly amazing period today in the newspaper industry. In mass communication in general, life as we knew it two decades ago has vastly changed. Consider this statement: ". . . (T)echnology is blurring the traditional definitions of communications media as well as the uses to which these media have been put. The press, radio, television, telephony (sic), and various other forms of communication are now still quite distinguishable, but advances in technology will render these media much, much less distinct to the end user, the consumer, you and I in our homes and businesses in the future."[1]

Our communication environment is being altered. Becker identifies at least six major trends, each of which involves the traditional print medium, the newspaper. These trends include (1) rapid increases in the number and kinds of sources of information, (2) eroding distinctions among most of the major media, (3) "demassification" of the media audiences with fragmentation, (4) an aging, changing audience which has less and less sexual distinctions with less and less available time for the media, (5) consolidation and development of cross ownership is continuing, and (6) an increasingly important role of the computer in all mass media industries.[2]

The combination of these trends will lead to the ultimate newspaper, one which is specifically tailored to individual readers with help of computer and cable/satellite communication.[3] While we are heading toward these personalized newspapers, we obviously have not yet reached that stage. Yet the computer has become an integral part of the newspaper. The newspaper has become computerized in just about all departments and components of the product. Computers are in use in the newsroom in what are commonly called "front-end systems." Computer front-end systems are elaborate word processing systems with massive storage capabilities. Computers are also major forces today in advertising, circulation, the newspaper's library, the business office, and the printing plant. We have become completely dependent upon these logical devices.

A study conducted by Doyle Dane Bernbach predicts "media environments" will undergo significant changes in the next decade. Computer-based technologies will be responsible for these changes which, the report says, will include changes in information available and the format in which it is obtained, more localized "zoned" editions, more equitable pricing for advertising, space ordering will be facilitated by computer, and reproduction and use of color will improve, and videotext—the computer-supported electronic newspaper--- will replace traditional sections of the newspaper.[4]

We are at the cutting edge. There is, as Schramm and Porter have noted, a special importance of the computer in the information revolution of the 1980s. They wrote the "ability to store almost endless amounts of information and retrieve it on demand brings us to consider the computer, which may well become the great communicating machine of the Information Revolution."[5] While Schramm and Porter do not predict what will happen in the years to come in this decade they suggest it will be an exciting time for communicators. They liken what is happening today in this information revolution to the beginnings of the industrial revolution. "The men and women at the beginning of the Industrial Revolution must have had some of this same sense of uncertain destiny. Unlike them, however, we shall have something to say about what happens," they wrote.[6]

The purpose of this research paper is to review new technological developments applied to the newspaper. More specifically, the intent is to review literature relating to computerization of the newspaper newsroom. Because many of the functions of the newspaper are inter-related today by the computer in production, the newspaper's technological developments cannot be discussed without consideration for changes in other departments as well. This essay will review relevant scholarly and professional literature published in the last seven years on computerization of the newspaper newsroom. An accompanying selected bibliography is attached to this paper. It is in revised form, but continued work will update it as new material is published.

About the Literature

As any developing body of mass communication technical literature goes, the literature concerning newspaper technology and the computer tends to be located generally in the professional literature and is beginning to become the concern of scholars in research journals. Reviewing literature published since the early 1970s, it is apparent the subject of technology and newspapers is only beginning to interest researchers in mass communication.

Professional journals such as Editor & Publisher, the American Newspaper Publishers Association (ANPA) Research Institute Bulletin (merged into Presstime in October 1979), Publisher's Auxiliary, the American Society of Newspaper Editors' The Bulletin, and ANPA's Presstime are the best sources of literature on technological developments in journalism. While these articles tend to be highly qualitative and descriptive, often based on case studies of new installations of equipment, these articles are extremely useful in setting the state of the art. Clearly, the frequency of production of professional publications such as these are assets in getting the most current information into the hands of the consumer as quickly as possible. ANPA's special editions of Research Institute reports are unfortunately slow in publication. With a move from Easton, Pa., to Reston, Va., this year, the delays may be even more severe before they improve. At present, the most recent edition of specification data for newspaper production equipment of ANPA-member newspapers is the 1981 report published last year. The most recent electronics report was issued for 1979 in 1980. Updated editions are expected later this year, according to ANPA's Research Institute.

Scholarly publications are more thorough in their review of developments. Journal articles, such as those in Journal of Communication or Newspaper Research Journal, are much more empirical in nature and provide quantitative evidence for support of hypotheses based on review of literature. While these are also narrow in scope, these articles and essays often provide the theoretical advantage for the reader uncertain about the reasons why certain technological decisions have been made and implemented. Scholarly literature is still "catching up" with professional literature. Journals publishing the most useful literature on technological developments in journalism are those which are interested in other technological changes (e.g., in broadcasting and other forms of publishing) as well. Leaders in research about technological change are Newspaper Research Journal and Journal of Communication. Clearly, other journals in mass communication have given attention to the subject, but perhaps not in as much depth or in as innovative a manner. Another genre of journals interested in

mass communication technological developments are graphics, computer, and information/library professional publications.

The first generation of books and disserations/theses discussing the impact of the new technological developments on newspapers have been, and are being, published. Leading scholarly writers are Anthony Smith and Benjamin Compaine. Among the prolific professional publications authors specializing in new technology are Bill Gloede and Earl Wilken, editors of the equipment news section of Editor and Publisher, and Sandra Puncekar, former editor of the ANPA R.I. Bulletin and presently a part-time writer for Presstime. New textbooks are also a source of general information on the subject.

Overview

Sitting in a candlelit room in Atlanta, where the power had gone out during an ice storm, Harvard researcher Benjamin Compaine talked about the impact of technology on the media and on society. Noting the irony of a power failure at a conference on new technology, Compaine said, "it's beginning to look like a jungle out there for media people and for the consumer." He asked, "Who is going to pay for it? What will it cost?"[7] Compaine raised questions we must consider as we review literature on technological development. These changes in the newsroom which will be discussed are possible, or soon will be. But we must also consider not only what the changes will enable us to do, but unless we consider economic factors as well as impact on the receiver of the message, much is lost. Unfortunately, however, we do not know many of the answers to Compaine's questions.

Computerization of the Newsroom

Smith argues that the newspaper took to the computer under the influence of the American Newspaper Publishers Association in about 1960. Prior to this, he notes, the newspaper limited application of the computer to business and commercial work done by an accountant. Gradually, market researchers began to use the computer, then the advertising department. Then came computer time sharing. This enabled designers to consider applications—- words. After hyphenation and justification problems were resolved in the 1960s, the door was completely opened.[8]

But the biggest concern is the change of the work habit of the newspaper newsroom and production plant and the physical changes which would also come from the technological developments.[9] Acceptance was slow at first, but it occurred without serious damage, if any at all, to the editorial product.[10] Nevertheless newspapers must select their front-end systems with the subtleties of selecting furniture for the home.[11] And to go with these new systems, newspaper have created new positions called "production editors" but known around many newsrooms as "system czars." And reporters will begin to change their functions in the newsroom because of the computer. Smith wrote: "The reporter is now equipped to become a rather different kind of information broker from the past. Many of the routines that necessitated reporters' performing humdrum reprocessing tasks are being or could be technologically eliminated. The newspaper, it is true, has to surrender a certain sovereignty to other intermediaries who have the right of direct input to its computer, but it has

more of an opportunity to review incoming materials and choose between the stories offered. The newspaper will probably be able to reduce the number of reporters or editor-hours used on a range of traditional copy-editing tasks and use the time to collect more original material or perform more thorough research . . . (T)he techniques of the newspaper librarian begin to overlap with those of the reporter, whose tasks becomes increasingly that of a collator and comparer of versions--- more of a scribal function in some ways. The more skilled the reporter the more of a researcher he becomes, a human scanner of data bases, an intermediary between the enormous and ever-growing store of available knowledge and the reader." In short, Smith thinks the computer will lead us to a new breed of reporter and editor in the 1980s not unlike a technician and specialist of a certain sort of news, quite the opposite of the general assignment reporter we still find today.[12]

All this has led to a new term --- "compunications" --- to represent the combined power of the computer and communications.[13] Moghdam emphasizes the importance of the computer in the newsroom by stating its purpose is to capture "the reporter's original keystrokes' . . . to record the initial reports in a format compatible with the requirements of the phototypesetting machines in order to avoid rekeyboarding, reduce errors, and provide the newsroom with greater control over the quality of the finished product."[14]

The computer serves several key functions in the newsroom. Its most dominant role today is in word processing, or internal copy processing regardless of the source of the copy (reporter, wire service, and such). Included in the word processing handled by the computer are keyboarding or writing and rewriting, editing, and data or story transfer from point to point in the newsroom. There are also special functions, such as a search and replace of words and phrases, definition of frequently used strings of words, and so on. Editing features include headline writing and counting, story measurement, automatic slugging, and so on. Today the increasing portability of the computer terminal has enabled newspapers to provide reporters on assignment to use terminals linked via telephone to the central processing unit of the computer for greater speed and accuracy of transmission of stories, especially under deadline. One of the most widely used applications has been in the sports department, where newspapers routinely send reporters on cross-country trips to follow professional and college teams. Political beat reporters are finding the same advantage at conventions and other similar events. And newspapers with bureaus have found these portable terminals easy means to link reporters to the central processing unit of the electronic editing system.

Computers are now being used for assistance in writing. Even before microcomputers with word processing software which added a proofing dictionary, newspapers were working on prototype spelling and proofing programs for their sophisticated electronic editing and reporting systems. ANPA research in the late 1970s led to checking and verification systems now in use at some newspapers.[15]

The computer is also a valuable tool for reporters in creating news. Reporters educated in the social sciences are learning means to apply "precision journalism" techniques to their reporting for greater accuracy and efficiency in analyzing data. The computer is useful in reviewing documents for content analysis. for survey research in public opinion polls and surveys, and for secondary research of data gathered by other sources (such as the U.S. Census

and other government agency reports). Reporters and editors are learning to use the computer as a predictive tool as well, using data collected to project trends and developments in their communities to mention only a few current applications.[16]

Reporters are also using microcomputers and computer terminals in their offices for reporting. Some metropolitan newspapers are thinking about, and some have already purchased, microcomputers to assist in analysis of budgets and other financial documents, data retrieval from distant data bases, and the more common word processing. Graphics capabilities of a microcomputer help reporters to understand complex statistics and reports, as well. Reporters using microcomputers in their jobs believe the computer helps them spot information and angles other reporters do not find so easily and as quickly.[17]

Clearly, the adaptation of the electronic editing system by the major news services has been an asset to the newspaper newsroom. Associated Press and United Press International provide electronic transmission service ("DataStream" and "DataNews" services at 1,200 words per minute compared to the old Teletype rate of 66 words per minute) for newspapers, loaded directly into the newspapers' computer data storage banks. Editors are able to review stories as they are transmitted, call them up instantly, edit, and send the copy electronically to the photocomposition system in composing within seconds. This development in the past ten years has enabled copy editing on national and international desks to remarkably change what it can accomplish and how quickly it can get tasks completed.[18] Computerization is directly responsible for increasing the volume of news received by newspapers and even how it is selected-- if an editor decides to program the computer to categorically delete stories (for unwanted regional news, for example). And obviously, it is responsible for the increase in speed in which reporters for wire services can produce stories and they can be transmitted to newspapers for publication at deadline times. The computer's capacities has allowed more up-to-date news to reach the reader faster than ever before.[19]

A developing body of literature has evaluated the impact of electronic reporting and editing systems on the news product. While some studies are concerned with the physiological effects of terminals on the human body, this is not a concern of this review.[20] Instead, we look at the impact of the computer on the editorial product. Randall found a brief increase in error rate during the transition period to an electronic editing system, but an eventual reduction in error rate below the base period.[21] There have been other studies on electronic editing effects, such as those by Crook, by Fisher, by Kurtz, by Shipley, Gentry, and Clarke, by Garrison, and by Stulce, to mention only a few conducted in the past seven years which have looked at what technology has done to the editorial product.[22] The results of these studies seem inconclusive at best, indicating the need for further research in this area.

The computer has become part of the telephone system. As more and more newspapers purchase and install their own telephone systems for newsrooms as well as the rest of the newspaper, the newspaper becomes dependent on the computer in one more way. Most new telephone systems are computer based. Systems such as CBX--- computer branch exchange--- are less expensive and programmable to tailor to individual newsroom and other departmental needs.[23]

In the darkroom, changes have also occurred with computerization. These changes affect developing and processing film, but also may change the very nature of the photograph. Instead of printing, photographers may find completely digitized and stored graphics as part of the complete pagination of the newspaper. After about 80 years of minor changes in the process, new developments are on their way---brought on by the computer. Now that almost all newspapers use 35 mm single lens reflex cameras, it will likely become obsolete with development of the electronic still camera---perhaps one of the newest applications of computer technology to the newsroom. This tool records images in digital form on magnetic disks rather than on film. For full pagination, graphics, as well as type, must be processed on a computer-based system. Professional and scholarly literature discussing this development is emerging. And the quality of electronic cameras which digitize images is gradually improving to publication quality. Herbert has written that Associated Press is involved in an "electronic darkroom" project which will digitize graphics. Digitization has been done for years, he says, with the problem really in "what to do with photographs after they are digitized--- how to manipulate them--- enlarge, crop, reduce, etc.; how to store data, both on and offline; and how to output this data to a pagination system."[24]

Editor and Publisher proclaimed in January that in terms of newspaper computer technology, 1982 was the year of pagination. A select number of newspapers are experimenting with full-page pagination, including graphics, in addition to Associated Press. Knight-Ridder Newspapers placed the first full pagination system ---with graphics--- in its newspaper in Pasadena, Calif. The system allows operators to view and compose whole pages of halftones, line art, and type. And, if projections for 1983 are correct, we will see this year as the period during which newspapers begin to adopt the concept of pagination and the year when the traditional composing room begins to disappear. Pasadena's newspaper is composed entirely in the newsroom, eliminating the need for a composing room as we have traditionally known it. The computer has become the compositor.[25]

Pagination Systems

The next step in computerization of the newsroom and composing room is already being taken. It began, if Editor and Publisher is correct, last year in California. This year continues the rapid growth of pagination. Newspapers are laying out news space, headlines, and other editorial content of the page on the computer. Pagination was first applied for display advertising layout and design, then gradually applied to layout and design of pages with both advertising and news holes. The computer terminal, in this case, takes stories already processed on the system and ready for dummying and permits the terminal operator to experiment with locations, designs of type, headline sizes, and such before the page is produced. These systems have been in use for several years now at various newspapers, but without graphics.[26] Pagination means different things to different people, at this stage in its development. Views differ, some literature indicates. Its potential is debated openly with various scenarios.[27]

Pagination systems must become even more economically feasible before they will receive widespread adaptation. Most newspapers seem to be "waiting to see" what early installations and experiments will reveal at the few newspapers using it at this time. At least one essayist in a professional publication expressed hope that by 1983 this barrier would be achieved and pagination would become a standard component of production equipment.[28] It has not yet, but the day is nearing as Editor and Publisher Equipment News Section Editor Earl Wilken wrote. Pagination, he said, is being "demystified" through seminars discussing strengths and weaknesses of pagination systems.[29]

Computerized Libraries

Branscomb has suggested that the general circulation lending library is a passing institution. The alternatives for housing and distributing information created by new technology have brought on a reevaluation of roles and reasons for the public library and its services. "Today the established patterns for creating books and collecting them in libraries are breaking down because of a number of new forces . . . " Branscomb argues.[30]

And with some extension of Branscomb's reasoning to the newspaper, which has its own library services to consider, we come to computerization of the newspaper library. For a number of years now, newspapers have considered the options in dealing with ever-growing numbers of folders crammed full with yellowing newsprint clippings. One solution is microfilm and microfiche to save space. Thus, one application of the computer was to serve as a fast indexing means for these massive collections of printed materials and photographs. Another, with the age of computerization, was complete storage and retrieval of information in massive computer systems---ideally interfaced with electronic reporting and editing systems. We are already using computers to locate information more quickly with computerized index data bases in daily use in many public and private libraries--- some of the literature review here was conducted using such a system which interfaces with data bases by long distance telephone lines. These systems enable us to locate books and articles on subjects we are interested in, and of course, are of immense use to enterprising reporters conducting background research on a subject. Becker also warns that the form of

books themselves will be changing in the next generation, with some form of microfilm, electronic recording, or other efficient storage device implemented to replace bulky books and magazines. Further applications of "electronic libraries" includes non-verbal materials such as sound recordings.[31]

Walker has pointed out the advantages of computerized libraries at newspapers, concluding that while prices and sophistication of these systems vary considerably, not many newspapers have installed such systems yet, most of the 18 newspapers which have them are metropolitan dailies with the financial resources to experiment with them. While newspapers are waiting to see if these systems are financially feasible, most librarians point out the advantages to such a system for the newsroom. "Newspaper librarians stress that electronic systems can improve reporting quality by making research material available to reporters at the push of a button. The information is more complete because a whole file dating back for as long as the system has been operating can be searched for information. In a conventional "morgue," there is virtually no way for a reporter to be sure that a particular clip file is complete."[32] Sharing information in the library is an option many publishers are considering to reduce cost of operation. Newspaper groups are beginning to consider possibilities of sharing costs for a central computer system linked by telephone lines. Knight-Ridder will be using Philadelphia, Miami, and Detroit as regional centers for its network of newspapers and broadcast outlets.[33]

What is the effect on the newsroom? In addition to research quality in reporting, such libraries will improve speed in reporting as well. Finding information quickly will enable reporters to finish stories faster, he points out. Thoroughness and accuracy in newswriting stand to be improved with such systems, also. Finally, these systems encourage reporters to use reference materials since they realize the material they seek will be there and not misplaced or lost. When old clip file systems fail to produce materials sought, reporters begin to use them less and less. This will not happen with an electronic morgue, Walker wrote.[34]

Other Newsroom Applications of the Computer

Newspapers are beginning to think about other applications of the computer's logical functions to improve its product. With the possibilities of the computer today, newspapers which do not even share the same physical plant can share resources such as a computer-based electronic editing system. Two newspapers, at least, are already doing this in Connecticut with newsrooms 7.5 miles apart. Production has been consolidated, but newsroom with terminals in different locations serve the two distinct news departments. There will, no doubt, be more of these trials now that the computer has made such interfacing possible by dedicated telephone lines.[35]

DeWeese writes about immediate content analysis application of the computer. In this, the idea is to content analyze the computerized newspaper just as it is published in computer-readable form without rekeypunching the editions. This effort has enabled editors, as well as researchers, to immediately investigate the daily effort of the professional journalists. When stories are quantitatively analyzed, obviously, a computer program is also used. The researcher can analyze the newspaper's news for the number of words, number of sentences, percentage of words or percentage of sentences in a particular

category, and so on for sections or the entire newspaper, or even a particular time series of several issues. A range of statistical analyses is possible beyond simple descriptive statistics. However, just as much of the technology we have discussed so far, DeWeese concluded the immediate content analysis by computer will not be a practical reality until costs are significantly reduced and capacities to handle large amounts of data (stories) are increased.[36] Editors have already begun to use computerized content analysis to improve their understanding of the product they edit. Editors are able to use content analysis-type computer programs to evaluate length of stories published, to assign the story into broad categories as well as specific categories to determine how much "attention" is being given to a topic over a period of time, the productivity of a given reporter, wire service stories used, photographs used by size and category, combined wire and local stories, and even assists in budget planning, and so on. It has led to another source of help for the editor's "instinct" used in making decisions about coverage, at least one newspaper's editors have claimed.[37]

Related to content analysis is another application described by Shamo. Analysis of writing, such as prediction of syllable count and readability in general, can be done by computer program. These approaches will no doubt be useful to editors, reporters, and writers for improvement in their craft.[38]

Today, an increasing number of newspapers are producing their own software for a number of newsroom and non-news tasks to cut costs for computer programs. These costs are often double the original investment in equipment in spite of the decline in the cost of hardware in the late 1970s. "New methods of program construction have been developed which promise to greatly reduce program design, coding, and maintenance costs. These methods, which improve the logical integrity and readability of programs, are now being offered . . . ."[39]

Advertising Applications

For a number of years now, newspapers have used word processing systems, the same or modified versions of electronic reporting and editing "front end" systems used in the newsroom, for classified advertising. Newspapers have also used computers to layout inside pages and to draw news space dummies. In fact, both VDT systems and optical character recognition (OCR) systems have been used for input of classified advertising copy for typesetting. The VDT system can offer the advantage of pre-programmed formats which can be used while the operator is taking the information by telephone. Today, these systems are intergrated for input and processing. In addition, the computer assists in editing, computing ad linage for an edition, cost of the advertisements, checks against bad credit risks from name and address of customer, and preparation of the bill.[40]

Display advertising has worked with electronic layout and design of advertisements with early versions of pagination terminals, since it is the product of the cooperative effort of many individuals and a central assembly device is desired. This form of information processing is more sophisticated than simple input of data that classified systems require, and therefore, more proficient operators.[41] But these systems are quite expensive, as we discused with pagination systems for news pages, and at this time high costs preclude the use of such devices at smaller newspapers lacking financial resources, even

though they are often cost-justified when production time is cut.[42] The advantages are clear--- greater ease and speed in moving blocks of type near deadline, savings in production costs, expandability, flexibility, modular makeup, and so on.[43]

A Brief Look at Production

Newspapers are increasingly concerned about electric power sources. With computerization of the newspaper newsroom and production facilities, newspapers must be prepared for emergency power failures. Because of this concern, there is a developing literature discussing alternatives to traditional power sources to assure continued service in the event of a storm, a blackout, and such. The American Newspaper Publishers Association has researched this to protect the newspaper published in an electronic environment. Editors and others in the newspaper production process shudder whenever the words on their VDT screens flicker during a power problem. There must be backups, ANPA says, and most newspapers have installed emergency generators independent of the usual electrical system.[44]

However, the purpose of this literature review is to look at the role of the computer in the newsroom, and we cannot completely ignore the computer's application of the computer in production. Today's newspaper is often produced in two different plants--- one located downtown for editorial and business purposes, for example, and another in the suburbs or at a different location for production and printing. We currently see this in Detroit, Quincy, Mass., and at other daily newspapers.

Some newspapers use messenger services for transmission of page images, but more and more newspapers are using facsimile transmission--- the electronic transmission of the page image from site A to site B. National newspapers such as the The Wall Street Journal and USA Today employ this production technique to permit fast dissemination and up-to-date editions in all regions of the country by using satellite printing plants. Satellite transmission of the page image is not new; it was first tried in 1967 across two continents and an ocean. Today, this more and more important in the production of national, regional, and local newspapers. And, of course, the computer is in the middle of the technical process, regulating transmission, scheduling, and other important factors in the efficiency and accuracy of the effort.[45] Research has started to look at the impact of facsimile transmission. Russell found increases in use of facsimile newspapers throughout the world. "Several major technological innovations have coincided to transform facsimile page transmission from pipe-dream to reality," he wrote. He identified a "global" effect, a "mobile" effect, and a "decentralized" effect of this new technology, and concluded: "It seems clear that facsimile transmission will continue to grow in popularity for some considerable time before reaching saturation point. Particularly because current technology permits transmission further and faster then ever before fax is likely to continue to help newspapers to realize regional, national, and even global aspirations."[46]

The computer is now a factor in work tasks in the mailroom as well. As mail rates increase, more and more advertisers will use the newspaper as an inexpensive distribution means--- considering more and more newspapers are producing segmented or zoned editions. This is not new, either, Moghdam notes:

"As with most other production operations, mailrooms were first computerized in the late 1960s, and early efforts were limited to off-line uses such as the daily production of draw sheets. Today most mailroom equipment is designed to be fully automatic . . . . "[47] Robots, operated by computer programs, are heading for the mailroom also, replacing people who stuff supplements into the newspaper.[48] Palmer wrote, 13 years ago, that computers can be programmed to set bundle sizes for trucks at the loading dock, only one of numerous advantages of their application.[49]

In circulation and marketing, there are numerous applications. Moghdam has concluded that "circulation and marketing constitute one of the most promising, yet least explored, areas for application of electronic technology." A number of newspapers are now using computerization of circulation by listing subscribers on computer systems, complete with account information. Computers also produce mailing labels for mailed issues, but also sort according to zip codes to produce further savings for the company. Yet most newspapers have not placed resources in such a direction to permit complete experimentation with the marketing potential of the computer. This will be a development for later in this decade.[50]

The goal is simply to modernize plants which are in desperate need to be more efficient and functional. When a newspaper goes through this, it is often a several stage effort. In one example in New York, the modernization began with conversion to offset in 1964. This was followed by installation of the photocomposition system three years later. The third stage was a new building in 1977 to house all new systems.[51]

The Electronic Newspaper

Today's newspaper, and the newspaper of the future, is taking an alternative form to the printed, home-delivered editions we are used to reading. This form has received perhaps the most attention of any computer- and technology-related changes in the literature. The printed version of the newspaper has been adapted to the television screen and recent research indicates this will be a trend to grow during this decade. A 1983 study by the American Newspaper Publishers Association and the Newspaper Advertising Bureau found 48 percent of sampled daily newspapers in the U.S. now operate or plan to begin a new telecommunications venture. Interest is highest among large newspapers, the study determined.[52] There are two basic forms for the consumer. First, the consumer may receive a one-way service as part of his or her cable television service which produces the printed text of a wire service story, a weather report, or stock market summaries on the full-color screen. The second, and far more sophisticated, is the two-way, or interactive, electronic newspaper which allows the consumer to read the news as he or she selects it and not just how it is programmed to the cable channel by the newspaper. This new form of the newspaper is creating many new opportunities for newspaper markets and as potential sources of revenue for newspaper companies fearing the end of the newspaper as we have known it.[53]

The non-interactive systems are often referred to as "teletext" and the interactive systems are known as "videotex."[54] Experiments on teletext began less than a decade ago in Great Britain and interest quickly grew in the United States. These systems seem to be a force for the future. Knight-Ridder will have Viewdata, an interactive system which has been tested extensively in the past several years in Coral Gables, Florida, in the three-county metropolitan Miami area this fall with an immediate goal of 5,000 customers.[55]

Reaction by consumers is an important research concern. Much early research is proprietary; however, scholarly literature is beginning to reveal discoveries of this research. Researchers are beginning to publish research concerning public use, expectations, and fears of such computerized information sources. Teletext consumers' use patterns were found by Elton and Carey to be quite similar at both public terminal sites and at home. Among other findings of the trial research was use mostly by males under age 45; use at home dropped off after the "novelty effect" wore off; and, they found, graphics were favorably received. The simplicity of teletext is an asset, they concluded, when compared to videotex.[56]

Many newspapers seek interactive systems for their initial electronic newspaper efforts, but are forced to choose, instead, the non-interactive systems as an alternative to very high research and development costs. Arrangements are made with local cable systems and a channel, perhaps several, leased or otherwise contracted for news and advertising messages. Abbott reports this was the option taken by a Massachusetts newspaper when suitable technology at an affordable price was not available.[57] Discussions with at least one other newspaper publisher have supported this strategy.[58]

The "dedicated newspaper," as some scholars have called this new form, seems an appropriate use of the computer in providing consumers with the most

up-to-date news product possible. "Of even greater value (than today's news) is current news individually packaged so that one need not plod through masses of irrelevant data in order to search out that which is of personal interest. It is this kind of tailored news service that network services can provide."[59]

Newspapers are playing a significant role in the emerging videotex industry. "Some of the country's larger newspaper organizations are, in fact, the driving force--- either acting alone and independently or in concert with other national corporations---behind an industry that is expected to generate anywhere from $9 to $19 billion by 1990," Morse wrote.[60] He also feels the personal computer is another force in shaping the videotex industry---a point which distinguishes the U.S. from other countries employing videotex systems. "With a million or two already in place, they eliminate the need for modifying a tv, as has been the procedure in most other countries. The personal computer has become the terminal which a growing number of Americans use for information retrieval services . . . ." he concluded.[61] Morse notes four major videotex trials and pilots underway by fall 1982: in Coral Gables, Fla.; in Mission Viejo and Palos Verdes, Calif.; in Ridgewood, N.J.; and in Manassas, Va. He also notes eight major videotex and information retrieval services available by early 1983, ranging from Dow Jones, the first in 1974, to Viewtron in Miami and Keycom in Chicago beginning in 1983. He identifies fourteen major teletext trials and pilots, beginning with Salt Lake City in 1978 to six future trials during 1982.[62] And, interestingly, a report in 1981 stated that electronic publishing may require as many as four diverse companies to be successful---one for information, one for communications, one for technology, and one for marketing.[63] Clearly, such an effort is not a simple one.

What Lies Ahead

Many newspapers are already "tailoring" the news for their readers through segmented, or zoned, sections of the newspaper, and this is just the first step. Smith wrote, "all futuristic breakthroughs are foreshadowed half a century before their time by processes that are the same in principle but carry different labels. All over the world now, for well over a decade, newspapers have been publishing local zoned editions, stuffed into the main paper, as a means of aggregating advertising from a small concentrated neighborhood together with suitable local news."[64] Eventually, he reasons, the newspaper industry is evolving into a "more efficient and less miscellaneous medium." We are, through the computer, reaching more and more toward the individual consumer. This, in effect, is passing along some of the "gatekeeper" decision making to the consumer. It is, at the least, a mind-boggling consideration for the journalist.

"It is clear that the future trends in technological development will have a great impact on the physical characteristics of the end product. Thus a discussion of the present and future systems will naturally lead into some speculation on the future of information packaging by newspapers," Moghdam concludes.[65] She continues, "Those newspapers in operation today that have not actively sought to computerize their editorial and production functions still find that the purchase of any new product or equipment invariably forces them into acknowledging the presence of electronic technology."[66]

Rowe suggests reporters in less than two decades may be able to telephone a computer from a remote location to dictate a story. While this may not seem so

unique, use of voice recognition is new. The reporter on the telephone will be recognized, and the signal translated into digital information and stored and used when needed--- all aiding the editing and makeup process.[67]

With microcomputers and minicomputers growing in development and application, the trend toward large mainframe computer systems with time sharing among departments has changed. Today, most newspapers, in their computerization and modernization efforts, are finding them reliable and able to complete assigned tasks.[68] Schmitz argues that by 1989 we will no longer be dependent on the mainframe computer. Taking its place will be these smaller computers "with more power and more storage than today (1979)." He continued: "The total system will consist of a lot of technological wizardry. But, it will be designed for newspaper people--- to set up, program, and manage. Subsystems will exist for a range of applications like page layout, classified, editorial and illustration at a range of prices for the smallest to the largest newspaper. The subsystem concept is the key to the future. It will be independent and unique for an application and will be connected in a network to handle the wide range of different jobs that have to be done to produce your newspaper."[69] And, there will be a continuing increase in software development at newspapers by in-house computer programmers. As newspapers become more and more specific in their needs, there will be a greater demand for tailored software to meet these needs. At the same time, common software needs among newspapers will lead us toward certain standard software from vendors outside the newspaper offices.

Thus, it appears that much of the research and development of computer applications in the newspaper newsroom in the remaining years of this decade will center on (1) pagination; (2) improved storage and retrieval of information; (3) further movement toward all-terminal systems; (4) increased use of satellite technology for wire service transmissions of news, made-up pages for regional printing centers, and other messages, (5) and improvements in software for computer users.

Pagination experimentation will continue to focus on digitization of graphics. As more and more newspapers computerize their newsrooms, they will continue to consider means by which the news, as well as reporter's notes, memos, and other non-published materials in electronic form can be preserved indefinitely for later reference. There will be continued movement toward all-terminal systems, as we have seen in the last five years. It is apparent writing is improved by use of terminals by producing cleaner copy, additional easier rewrites, and a host of other reasons outlined in the literature.[70] Review of ANPA Research Institute Bulletins indicate mercural growth in use of terminals since 1970 and there is no signs of this slowing. Wire services are becoming more and more dependent on satellite communications networks to provide greater speed at lower cost in transmitting news to newsrooms across the world. Obviously, this is not the only application. We will use satellites to transmit pages to regional printing centers and to link newspapers in groups for their own communications system. The goal of all this is to completely produce the newspaper by electronic means. The natural extension of this product is electronic home delivery. And, as we said at the outset, this is already developing and will be available to the consumer on a wider scale in the not-so-distant future.

In 1983, the experts have predicted a continuation of the trends we have just discussed. Many of these trends began at the start of this decade and will

be further developed this year. Among them are work toward more computerization of non-news departments, more cost-cutting, standardization of ad sizes, wider adaptation of pagination, and increased use of robotics.[71] The newspaper's product--- news--- will be enhanced by continued technological advances. Among these are (1) cost-effective geographic and demographic newspapers (and higher advertising revenues); (2) a better quality newspaper created by faster, more easily and more economically production methods as labor-intensive areas' costs decline; and (3) new data base management and marketing possibilities for auxiliary products and services.[72]

But the computer is not all that we must be concerned about when we think about technology and the newspaper. Harte-Hanks Newspapers Executive Robert G. Marbut has concluded the newspaper industry is "in the midst of the most rapidly changing environment in the history of communications, and it will directly affect every one of us . . . whether we like it or not, whether we are ready or not."[73] And two years later, he added: "(T)wo technologies (computers and telecommunications) are either the major threat to our business or the key to our future. Why? . . . We're really information providers."[74]

FOOTNOTES

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